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four lines of No. 5. Proposition 6, also, is a good one. Propositions 7, 8 and 9 seem to me will eventually go by the board, as either unnecessary or wide of the mark. No. 8, for example, is an impossibility, as has been pointed out by Professor Magie.

I also find myself in agreement with those who would readily dispense with any high school physics for college students provided the student is mature, earnest and of general good training. It is not a question of having a previous knowledge of physics, but of capacity for plenty of hard work and of close application.

I am also inclined to sympathize with Professor Mann's position that the best judge of what a *high school* course in physics should be is the *high school* instructor himself. After all, is not the problem of high school physics one that the high school instructors should be allowed to work out independent of any overlordship on the part of the universities? There is, I believe, a justly growing resentment and impatience on the part of high school instructors at the dictation of the universities. The colleges and universities can well afford to let them work out their own four years' problem, asking only that such examples of their product as come up to the universities be creditable representatives of their labor. I am sure that the high school instructors are just as ambitious as the universities and colleges to show results, and I am inclined to believe that a good deal of the dictation on the part of higher education to the secondary schools handicaps instead of helps them. I am also inclined to believe that in letting the high school instructor have free scope with his high school course he should stop asking colleges and universities to give advanced credit to the high school students. It is for these reasons that it seems to me that propositions 7, 8, 9 and 6, also, are unnecessary, as well as the latter part of proposition 5.

The question of dynamics in section 9 is one which I hope the high schools would answer by teaching and not by omitting the subject of kinetics. It seems to me unfortunate for high school students to pass out

into the world with no attempt at quantitative ideas in this subject, and that the high school teacher is likely to gain rather than lose by meeting the issue squarely instead of evading it merely because it is hard. While this is my view, I would be perfectly willing to leave the solution of this question, with all the rest of the high school course, to the high school teachers.

In closing I would express a hope, as does Dr. Hall, that the discussion may go on and not be closed even with his most excellent discussion.

JOHN C. SHEDD

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SCIENTIFIC BOOKS

Ancient Plants. By M. C. STOPES. Pp. viii + 198, figs. 122. London, Blackie & Son, Ltd. 1910.

This well-written and well-illustrated little book furnishes another striking illustration of the difficulty of writing in a non-technical way about a technical subject. As is usually the case, some aspects are made too primer-like while others are highly theoretical and out of place, as for example the concluding discussion in the present work regarding the probable future evolution of plants.

The work is well planned and the facts presented seem in general to bear close scrutiny, although many of the geological statements, while true for Great Britain or even western Europe, hardly apply to the rest of the world. The book is typically English, and will no doubt prove a very useful elementary text in that country. The author's frequent use of the phrase "microscopical standpoint" well serves to illustrate the point of view and explains her statement in the introduction that Williamson was the foremost contributor to paleobotany. No one will dispute Williamson's well-earned renown, but it is very doubtful if he would be considered the foremost contributor to even Carboniferous paleobotany outside of England, and his influence is more or less responsible for the neglect with which the splendid Tertiary floras of the south of England have been treated. Again Lindley & Hutton's "Fossil Flora of Great Britain" is

a classic, but like some other classics it has little except a historic interest at the present time and is not comparable to the contemporaneous work of Brongniart or Sternberg.

It is reassuring to see that British paleobotanists have readmitted ferns to the Paleozoic flora after having banished them almost completely a few years ago, and another praiseworthy feature of Miss Stopes's book is her recognition of the grave objections to the derivation of the angiosperms from the Mesozoic cycadophytes. To mention certain points which strike the reviewer as misleading, it is very doubtful if the older Paleozoic was of longer duration than the balance of time since its close. Again, Newer Mesozoic, Upper Mesozoic and Upper Cretaceous are used as synonyms, and if we are to understand that Lower Mesozoic includes Lower Cretaceous then monocotyledons and dicotyledons are well represented in the Lower Mesozoic of both Europe and America, despite the author's statement to the contrary.

The wide differences between floras of pre-Tertiary epochs are entirely fictitious, and it may be questioned if some of the Triassic "Equisetites" are not nearer the Paleozoic Calamites than they are to modern equisetums. It is true that *Neocalamites* and *Pseudannularia* are not petrified, but they are almost wholly unlike *Equisetum*. The differences between the Permian and Triassic floras has the sanction of long-continued reiteration, but that the statement is venerable does not make it true, and the more we know of the somewhat scant floras of the earlier Triassic the more Paleozoic their affinities appear.

If in an elementary work it is permissible to speak of *Lepidodendron* and its allies as if they were club-mosses it seems like straining at a gnat to insist that the Mesozoic *Bennettitales*, so-called, were not cycads. The differences between Cycadeoidea, to use the correct term, and modern cycads is scarcely greater than between *Lepidocarpon* and *Lycopodium*. Incidentally the author seems to have forgotten the rather numerous impressions of Paleozoic cycadophytes.

Miss Stopes's statement that fructifications

are always the most important part of the plant will depend entirely upon the plant considered and the point of view. The established fact of the plasticity of the reproductive parts in most of the great Paleozoic plant phylæ is clear evidence that they furnish less reliable data for the determination of their points of contact with later plants than is furnished by stem anatomy or even foliar characters. A striking instance of a similar sort is furnished by the analogy between the so-called flowers of the Mesozoic cycadophytes and those of angiosperms.

Chapters VIII. to XVII., dealing with the past histories of plant families, are in the main well written, although that devoted to the angiosperms is relatively poor, as is usually the case in all discussions of this class of plants. The author's caution regarding the value of negative evidence in dealing with the Cretaceous flora seems to have been forgotten in her consideration of the very special kind of a flora which the Carboniferous rocks have almost universally yielded, and it may also be worth mentioning that other factors besides a cold season will account for leaf fall, and annual rings, so-called.

For those who have read thus far and have wondered what excuse the book has for its existence it may be pointed out that it is the only modern attempt at a summary of our present knowledge in the field of paleobotany. The author is quite at home in the realm of anatomy and morphology and gives a very readable summary of the present state of knowledge in this field which has been so admirably tilled of late years, particularly by the botanists of Great Britain. The chief defect of the book is the attempt to spread the morphology and anatomy of the Carboniferous swamp-flora, or the concepts derived from its study, over all geological time the world round.

It is perhaps unfair to expect an avowed primer to be a manual, nevertheless it remains true that a satisfactory paleobotanical text, either elementary or exhaustive, which will maintain a proper balance between fossils showing the external form of plants and those

revealing their internal structure still remains unwritten.

EDWARD W. BERRY

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Fish Stories. By CHARLES FREDERICK HOLDER and DAVID STAR JORDAN. New York, Henry Holt and Co. American Nature Series.

A most readable book indeed is this by Holder and Jordan, interesting alike to the lover of angling, the lover of nature and the lover of good stories. A few short historical chapters, by way of introduction, put us in touch with the tellers of "fish stories" from Jonah down to John Hance, including such famous raconteurs as Pliny, Olaus Magnus, Sir John Mandeville and Izaak Walton, while a selection of the best of the classical yarns leaves the reader in a proper spirit of appreciation for the modern ones that follow.

But it must not be supposed that the book is entirely a record of prevarication. On the contrary, it contains much more of perfectly good natural history, told in such a manner that the unscientific reader can easily grasp it, yet losing nothing in scientific accuracy thereby—a rather unusual combination in nature books. The untruths which serve as a spicing for the work, are such "whoppers" that even the most guileless and credulous reader will have no difficulty in distinguishing them as fiction.

Instructive and entertaining chapters treat of the occurrence, life histories and habits of the various trouts and salmons, the seal, the deep-sea fishes, coral-reef fishes, etc. In discussing the flying fishes, the authors support the view that the propelling force comes from the movements of the tail just as the fish is leaving the water, and that the paired fins act after the manner of an aeroplane. The scientific world is by no means agreed upon this point, as the authors admit, and many good observers are equally as insistent that the fins are moved in flight so rapidly as to deceive the eye ordinarily.

There is much information on the larger fishes of the sea that will clear up the hazy notions of the uninitiated, and a chapter is well devoted to the sea-serpent. This classical animal, which has given rise to more mis-

understanding and downright prevarication than perhaps any other animal, is shown to be, under certain circumstances, a figment of the imagination induced by over-indulgence in the favorite "bait" of fishermen. The other class of stories is shown to be due to the misconceptions of untrained observers upon obtaining a partial view of various marine animals. The great "oar fish" (*Regalecus*), a long ribbon-like form with a high frill-like dorsal fin, which reaches a length of at least 22 feet, and occurs in both the Atlantic and Pacific oceans, is no doubt largely to blame for these stories. The much smaller sea-snakes, and perhaps some other elongated forms may also be responsible in part.

While the authors give us the benefit of their experience in angling for various sorts of fishes, they at the same time protest strongly against the practise of "pot-hunters" among fishermen, who take large numbers for the sake of a record, and, being unable to make use of them, allow them to rot on the bank. "Trout-hogs, we call them, but in doing so we owe apologies to the relatively well-behaved swine."

We can not help wishing there were more such books treating authoritatively of other animals in this delightful manner, imparting so much reliable information and at the same time affording the reader so much pleasure.

R. C. O.

The Freshwater Aquarium and its Inhabitants. By OTTO EGGELING and FREDERICK EHRENBERG. New York, Henry Holt and Co.

Some idea of the popularity of the standing aquarium as an object of study and means of recreation is afforded by the number of recent books bearing on the subject. The reviewer is aware of something like a dozen such issued within the past decade. The most recent of these, and the one under discussion, is largely a compilation simplified for the beginner, and professes to be "a guide for the amateur aquarist."

There is some good advice to the beginner concerning the form, placing, bottom, planting